

NON-PUBLIC?: N  
ACCESSION #: 9404190127  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: D. C. COOK NUCLEAR PLANT - UNIT 2 PAGE: 1 OF 04

DOCKET NUMBER: 05000316

TITLE: UNIT 2 REACTOR TRIP ON LOW-LOW LEVEL IN STEAM GENERATOR  
#4 AS A RESULT OF INADEQUATE VALVE ACTUATOR/STROKE  
ADJUSTMENT PROCEDURE  
EVENT DATE: 02/21/94 LER #: 94-001-00 REPORT DATE: 03/23/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 060

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: G. A. WEBER - PLANT ENGINEERING TELEPHONE: (616) 465-5901  
SUPERINTENDENT

COMPONENT FAILURE DESCRIPTION:  
CAUSE: D SYSTEM: SB COMPONENT: FCA MANUFACTURER: F130  
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On February 21, 1994 at 1413 hours with Unit 2 in Mode 1 at 60 percent Rated Thermal Power, Unit 2 received a reactor trip signal from a Steam Generator No. 24 low-low level condition. At the time of the trip, the Control Room crew was restoring Main Steam Stop Valve 2-MRV-240 to operable status. The valve had been declared inoperable earlier in the day (1043 hours) to repair Beat leakage on 2-MRV-241, one of the two associated dump valves. The repair work required voluntary entry into Technical Specification 3.7.1.5, which allowed continued power operation provided the inoperable valve was restored to operable status within four hours. When the dump valve was placed in service following repairs, it failed to remain closed. This caused the stop valve to begin to quickly close, which in turn, lead to a reactor trip on low-low steam generator level.

The root cause of this event is attributed to the valve actuator recoupling procedure. The procedure for inspection and adjustment of pneumatic/spring actuators, associated positioners, and limit switches was revised to improve the direction for coupling actuators to valves to better ensure the correct stroke length and set pressures are accurately obtained when coupling the valve to the actuator.

All safety systems operated normally in response to the trip signal. The event had no actual or potential adverse impact on the health and safety of the public.

END OF ABSTRACT

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Conditions Prior to Occurrence:

Unit 2 in Mode 1 (Power Operation) at 60 percent Rated Thermal Power.

Description of Event:

On February 21, 1994 at 1413 hours, Unit 2 received a reactor trip signal from a Steam Generator No. 24 low-low level condition. At the time of the trip, the Control Room crew was restoring the Main Steam Stop Valve (MSSV), 2-MRV-240 (EIIS/SB-ISV), to operable status. The valve had been declared inoperable earlier in the day to perform work on 2-MRV-241 (EIIS/SB-FCV), one of the two associated dump valves.

2-MRV-241 was found to be leaking by on January 31, 1994. On February 21, 1994, at 1043 hours, 2-MRV-240 was declared inoperable (taken out of service) to repair 2-MRV-241. At this time, the Action Statement for Technical Specification 3.7.1.5 was entered, giving a four hour time limit to complete repairs. Maintenance Mechanics began repairs on the valve after Operations removed it from service and I&C personnel removed the air line to the valve actuator. The valve was disassembled and new parts were installed. While the mechanics worked on the valve, I&C personnel performed an inspection and a bench set on the valve's actuator. Maintenance Mechanics completed the valve repairs and re-mounted the actuator on the valve. After the valve and actuator were reassembled, I&C personnel set the valve stroke. The limit switches were then installed on the valve and set for proper indication. The air line was connected, the quick exhaust valve was installed, and the valve was turned over to Operations for testing and return to service.

Operations proceeded to pick up the clearance. The MSSV 3-way valve, 2-MMO-240 (EIIS/SB-ISV), was returned to the neutral position, readmitting steam pressure to 2-MRV-241. As this took place, 2-MRV-240 began to quickly close. This resulted in a Steam Generator pressure increase. The Steam Generator pressure increase resulted in collapsing steam voids in the associated steam generator, and a corresponding rapid reduction in steam generator level. Upon reaching low-low Steam Generator level (less than 21 percent), the reactor tripped.

#### Cause of Event:

Investigation of the event revealed that the valve actuator was improperly recoupled to the valve, leaving the valve with insufficient pre-load to maintain it in the closed position against the steam pressure that acts on the valve disc when the valve is in service. With the valve disc positively seated, the actuator was found to have been positioned 2 to 2-1/2 inches from the fully retracted position. To maintain this position, it was necessary to apply a pressure of 32 psig to the actuator. The actuator should have been coupled to the valve stem with the actuator positioned 3/4 inch from the fully retracted position. This would have required the application of only 17 psig to the actuator. Full actuator pressure is 50 psig. The design pre-load force is proportional to the difference between full pressure and the minimum pressure required to Beat the disc, or 33 psig. By recoupling the actuator to the stem improperly, the pressure was only 18 psig, or approximately 55 percent of the design value.

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#### Cause of Event continued:

The root cause of this event is attributed to the actuator recoupling procedure. It was determined that the procedure did not contain an adequate level of detailed instructions to ensure the quality of work necessary under the time constraints imposed by the LCO for this job. If the procedure had contained adequate instructions on how to position the actuator for coupling to the valve stem, and acceptable tolerances for bench set and valve stroke, this event would not have occurred. With time pressure to complete the work within the LCO time limit, the discrepancy between the design pre-load value and the actual as-left value was not recognized.

#### Analysis of Event:

This event is being reported per 10CFR50.73(a)(2)(iv) as an event that resulted in automatic actuation of Engineered Safety Features (ESF), including the Reactor Protection System (RPS).

A reactor trip occurred when a low-low level condition was received by the RPS. All control rods fully inserted, the turbine tripped, both the Motor Driven Auxiliary Feedwater Pumps started, and a feedwater isolation occurred; all as designed.

The RCS continued to cool down following the reactor trip, dropping Tav<sub>g</sub> to 535 degrees F. It is most probable that some of the secondary safeties in Loop 4, lifted when 2-MRV-240 isolated. Other Steam Generator safeties were noted to be leaking by, along with 2-MRV-241 blowing by (approximately 30 percent open) after the trip. These conditions, combined with lower than normal decay heat (60 percent power operation, long term), and heavy auxiliary steam loads caused the slight cool down below 541 degrees F. Unit 2 Auxiliary Steam was being used for Unit 2 Turbine auxiliary equipment and the Plant's heating loads for both Units. In response to the continued cool down, the remaining Main Steam Stop Valves were closed and 2-MRV-241 isolated. Temperature then stabilized and returned to 543 degrees F where it was controlled by the Steam Generator PORVs.

A letdown isolation occurred automatically due to pressurizer level decreasing below 17 percent. This was due to the lower-than-normal decrease in RCS Tav<sub>g</sub>. Letdown was restored to service shortly after the trip. All systems functioned as required; no unusual conditions occurred, except for the Main Steam Stop Valve (2-MRV-240) closure, and the slightly greater-than-normal RCS cool down rate.

Normal offsite power was available, the diesels were in standby, and no safety equipment was out of service prior to the trip. This event did not have any actual or potential adverse impact on the health and safety of the public.

#### Corrective Action:

Work activities were performed to correct the pre-load values on 2-MRV-241. The bench set, with the actuator uncoupled from the valve, was verified to be correct for the required stroke length. The actuator was then properly coupled to the valve. Testing was performed to verify proper operation, required stroke length, and required pressure values.

Corrective Action continued:

The procedure for inspection and adjustment of pneumatic/spring actuators, associated positioners, and limit switches was revised to improve the direction for coupling actuators to valves to better ensure the correct stroke length and set pressures are accurately obtained when coupling the valve to the actuator. In addition, an instruction was added to check the bench set values after the valve is coupled to the actuator and after the stroke length has been set. The procedure will also be revised to include acceptable tolerances for stroke length and bench set pressure values.

Failed Component Identification:

Component Name: Steam Generator No. 4 Stop Valve  
MRV-241 Steam Cylinder Train 'A' Dump Valve

Manufacturer: Fisher Controls Co.  
Model: CONV:00053244  
EIIS Code: SB-FCV

Previous Similar Events:

None

ATTACHMENT TO 9404190127 PAGE 1 OF 1

Indiana Michigan  
Power Company  
Cook Nuclear Plant  
One Cook Place  
Bridgman, MI 49106  
616 465 5901  
AEP  
INDIANA  
MICHIGAN  
POWER

March 23, 1994

United States Nuclea  
Regulatory Commission  
Document Control Desk  
Rockville, Maryland 20852

Operating Licenses DPR-74

Docket No. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Report System, the following report is being submitted:

94-001-00

Sincerely,

A. A. Blind  
Plant Manager

/sb  
Attachment

c: J. B. Martin, Region III  
E. E. Fitzpatrick  
P. A. Barrett  
R. F. Kroeger  
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NRC Resident Inspector  
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